REMARKS

Reconsideration and further examination are requested.

Disposition of the Claims

33 claims have been presented during prosecution.

Claims 1-13, 21, & 24-25 were previously canceled without prejudice or disclaimer.

Claims 14-20, 22-23, & 26-33 are pending in the application.

Claims 14-18, 20, & 26-30 are withdrawn from consideration.

Claims 19, 22-23, & 31-33 are rejected.

Claim 19 & 31 are currently amended, without prejudice or disclaimer.

Support for each amended claim is found in paragraphs [0041] to [0049] and [0067] to [0074] of the specification as-filed (translation), in particular a paragraph [0044], which, in part, reads:

> The ultraviolet treatment unit 31-2 is composed of an UV-transmitting reaction bath 31a for forcing the oxidized water 17 to inflow and an UV lamp 31b disposed outside of the reaction bath 31a. The UV 6 emitted from the UV lamp 31b passes through the reaction bath 31a and is irradiated on the oxidized water 17 to decompose the COD components in the oxidized water 17.

See also, FIGS. 13-15 of the as-filed drawings.

This amendment adds, changes and/or deletes one or more claims in this application. A detailed listing of each claim that is, or was, in the application, irrespective of whether or not the claim remains under examination in the application, is presented, with a status identifier.

Indefiniteness rejection

Claims 19, 22, 23, and 31-33 were rejected under 35 U.S.C. § 112, second paragraph for reciting *such as*. OOa, ¶¶ 3-5. Claims 19 and 31 are currently amended to read, in relevant part, as follows: *A wastewater treatment apparatus capable of removing* ~~*persistent substances such as*~~

COD components .... As such, the rejection should be withdrawn as to claims 19 & 31.

The remaining rejected claims depend from claim 19 or 31. Since the base claim avoids the issue, the remaining rejected claims avoid the issue. Thus, the rejection should be withdrawn.

Obviousness rejection

There are two rejections. Each is addressed under a separate header.

Obviousness is determined in view of the *Graham* factors, several of which are in dispute here. For the reasons noted below, each rejection cannot make out a *prima facie* case of obviousness and should be withdrawn.

Claims 19, 22, and 23

Claims 19, 22, and 23 were rejected under 35 U.S.C. § 103(a) as being obvious over USAPN 2002/0117392 ("Noguchi") in view of U.S. Patent No. 5,302,356 to Shadman et al. ("Shadman") and U.S. Patent No. 6,403,030 to Horton, III ("Horton"). OOa, ¶¶ 6-12, 17-18. The Examiner admitted that "Noguchi is different from claim 19, in that Noguchi does not teach a pump which feeds oxidized water from the wastewater treatment bath to the ultraviolet treatment unit reaction bath, or that the UV lamp is provided above the reaction bath." OOa, p. 5. In an attempt to remedy these deficiencies, the Examiner relies on the teachings of Shadman and Horton. These latter teachings will be addressed after noting an example from the present specification.

With the arrangement according to an embodiment of claim 19, COD components of the gasified wastewater may be effectively treated by combining oxidization by adding an oxidizing reagent and decomposition of organic materials through an advanced oxidization process using a combination of an ultraviolet ray and an oxidizing reagent, as illustrated by the description at paragraph [0070] of the as-filed specification (translation). In particular, refer to Experimental Example 3, which is reproduced in relevant part below.

> [Experimental Example 3]
>
> After the wastewater treated with hydrogen peroxide was once reduced, 500 mg/L (a range experiments were performed was 150 to 700 mg/L) of hydrogen

> peroxide was added again. The treated water was fed into the wastewater treatment bath 12 shown in FIG. 15. Using the ultraviolet treatment unit 31-1 shown in FIG. 13, the wastewater was circulated and advanced oxidization was applied while the UV was being irradiated by two 28 Watt low-pressure UV lamp at main wave length of which is 254 nm. The COD concentration was decreased to 5 mg/l during 60 minutes."

(Emphasis Added). At least this embodiment shows advantageous merits of an embodiment falling within the scope of claim 19.

These advantageous merits, on the contrary, are not suggested by Noguchi. Namely, from the following description of Noguchi at page 4, ¶ 46, no such merits are suggested:

> The liquid is purified by using the apparatus shown in FIG. 12, as follows. After passing the photocatalytic reaction vessel 63, the liquid is allowed to flow into a second pH adjustment section 67. In this section 67, pH of the liquid is made to be in a neutral range by adding a basic solution to the liquid from a second pH adjustment pump 68. Immediately upstream of an outlet 69 of the apparatus, a second pH sensor 70 is disposed to monitor pH of the liquid. Based on this monitored pH of the liquid, the controller 59 controls the amount of the basic solution from the pump 68 to properly adjust pH of the liquid. (Emphasis Added) After the pH adjustment in the section 67, the liquid is released from the apparatus.

From this disclosure, it can be seen that pH of the liquid (treated water) which is released from the outlet 69 is only monitored by the pH sensor 70. Thus, it is difficult to say that the perfectly adjusted liquid (treated water) is discharged from the outlet 69. (Emphasis Added) Further, no experimental data regarding the final treated wastewater is presented or disclosed therein.

Accordingly, Applicants submit that Noguchi, alone or in combination, fails to render obvious an embodiment falling within the scope of claim 19.

Shadman discloses an ultrapure water treatment system. Shadman, according to the Examiner, teaches that provides a pump just upstream of the UV treatment chamber in order to

control the supply of water to the UV reactor (See 45 in Fig. 1 and see col. 3 lines 1-5)." OOa, p. 5. The Examiner concluded that "it would have been obvious … to provide a pump just upstream of the UV reaction chamber in Noguchi in order to control the supply of water to the UV reactor, as taught by Shadman; and in doing so, to provide a pump which delivers oxidized water from the treatment bath to the UV reaction bath, since the water entering the UV chamber has passed through the wastewater treatment bath." OOa, p. 5. Regardless of whether or not this is true, for the reasons just noted above, Applicants submit that Noguchi and Shadman, alone or in combination, fail to render obvious an embodiment falling within the scope of claim 19.

Regarding Horton, the Examiner stated that "Horton explains that the use of a UV source above the liquid to be treated reduces maintenance time since quartz sleeve will not become fouled, and he concludes that "it would have been obvious … to provide a UV light above the UV treatment bath in Noguchi in order to provide a UV source requiring reduced maintenance as taught by Horton." OOa, pp. 5-6. There is no reason to do what the Examiner proposed, as Horton teaches the use of "wiper glides over the sleeves to remove the deposits, which may block the light emitted from the UV lamp." Horton, col. 5, ll. 22-24.

Furthermore, Horton discloses an ultraviolet wastewater disinfection system and method. Namely, the UV light source may be presented in a vertical riser configuration, as shown generally at 200 in FIG. 3, which includes a UV light source 310. Referring to FIG. 3, the UV light ray output 350 exits the housing above the fluid 210 to be treated, this fluid entering the VRC from the outlet pipe 120 of the holding container or reservoir 110 and being forced upward through the interior pipe 220 of the VRC 200 toward the UV light ray output 350 that is projected downward toward the fluid surface 230 and into the fluid 210 to be treated, once again with the fluid moving upward toward the UV light source 310. At least one interface plate 240 may be fitted to the top of the interior pipe 220, thus increasing the exposure time of the fluid 210 to the UV light ray output 350. The at least one interface plate 240 contains a hole or holes 250 that allows fluid rising upward through the interior pipe 220 to exit at the top of the pipe. The fluid then traverses across the superior surface 260 of the interface plate 240 to the plate edge 270, where it then descends into the exterior chamber 280 of the VRC. The fluid is prevented from returning into the interior pipe 220

by a base plate 290 that solidly connects the exterior of the interior pipe 220 with the interior of the outer pipe 295. The fluid then exits the VRC 200 through the pipe or outlet 140. The UV light rays 330 may be projected downward from a UV light source or a lamp system 310 that includes optical components.

Horton's arrangement is completely different from the invention according to claim 19, which recites:

> *an ultraviolet ray-transmitting reaction bath for forcing the oxidized water fed from the pump to inflow; and*
>
> *a pair of ultraviolet lamps that are disposed outside the reaction bath, so that an ultraviolet ray emitted from the pair of ultraviolet lamps passes through the reaction bath and is irradiated on the oxidized water to decompose the COD components in the oxidized water.*

To facilitate the Examiner's understanding, he is referred to Figure 13, and paragraph 44 of the specification, where it is noted that the apparatus comprises an ultraviolet ray-transmitting reaction bath (31a) for forcing the oxidized water fed from the pump to inflow: and a pair of ultraviolet lamps (31b, 31b) that are disposed outside of the reaction bath. (Emphasis Added).

Thus, for the reasons just noted above, Applicants submit that Noguchi, Shadman, and Horton, alone or in combination, fail to render obvious an embodiment falling within the scope of claim 19.

Therefore, Applicants submit that independent claim 19 is patentable.

Dependent claims 22 and 23 depend from patentable claim 19. Therefore, each of claims 22 and 23 is also patentable for the reasons already offered. Each rejection should be withdrawn.

Claims 31-33

Claims 31-33 are rejected under 35 U.S.C. 103(a) as being obvious over Noguchi in view of Shadman. OOa, ¶¶ 13-18. Claim 31, similarly to claim 19, recites

> *an ultraviolet ray-transmitting reaction bath for forcing the oxidized water*

fed from the pump to inflow; and

a pair of ultraviolet lamps that are provided outside the reaction bath, so that an ultraviolet ray emitted from the pair of ultraviolet lamps passes through the reaction bath and is irradiated on the oxidized water to decompose the COD components in the oxidized water.

Similarly to the remarks above, claim 31 is patentable for analogous reasons to those offered for claim 19. Thus, for analogous reasons, a *prima facie* case of obviousness cannot be made, and the rejection against claim 31 should be withdrawn.

Dependent claims 32 and 33 depend from patentable claim 31. Therefore, each claim 32 and 33 is also patentable. Each rejection should be withdrawn.

Conclusion

To the extent necessary, a petition for an extension of time under 37 C.F.R. 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 07-1337 and please credit any excess fees to such deposit account.

Respectfully submitted,

LOWE HAUPTMAN HAM & BERNER, LLP

/Sean Allen Passino, reg. no. 45943/
Sean A. Passino, reg. no. 45943 for
Benjamin J. Hauptman
Registration No. 29,310

1700 Diagonal Road, Suite 300
Alexandria, Virginia 22314
(703) 684-1111
(703) 518-5499 Facsimile
Date: July 6, 2011
BJH/SAP/hmw